National Institute of Environmental Health Sciences

Risk indicators for the tick Ixodes ricinus and Borrelia burgdorferi sensu lato in Sweden

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Abstract:

The distributional area of the tick Ixodes ricinus (L.), the primary European vector to humans of Lyme borreliosis spirochaetes (Borrelia burgdorferi sensu lato) and tick-borne encephalitis virus, appears to be increasing in Sweden. It is therefore important to determine which environmental factors are most useful to assess risk of human exposure to this tick and its associated pathogens. The geographical distribution of I. ricinus in Sweden was analysed with respect to vegetation zones and climate. The northern limit of I. ricinus and B. burgdorferi s.l. in Sweden corresponds roughly to the northern limit of the southern boreal vegetation zone, and is characterized climatically by snow cover for a mean duration of 150 days and a vegetation period averaging 170 days. The zoogeographical distribution of I. ricinus in Sweden can be classified as southerly-central, with the centre of the distribution south of the Limes Norrlandicus. Ixodes ricinus nymphs from 13 localities in different parts of Sweden were examined for the presence of B. burgdorferi s.l. and found to be infected with Borrelia afzelii and Borrelia garinii. Tick sampling localities were characterized on the basis of the density of Borrelia-infected I. ricinus nymphs, presence of specific mammals, dominant vegetation and climate. Densities of I. ricinus nymphs and Borrelia-infected nymphs were significantly correlated, and nymphal density can thus serve as a general indicator of risk for exposure to Lyme borreliosis spirochaetes. Analysis of data from this and other studies suggests that high densities of Borrelia-infected nymphs typically occur in coastal, broadleaf vegetation and in mixed deciduous/spruce vegetation in southern Sweden. Ixodes ricinus populations consistently infected with B. burgdorferi s.l. can occur in: (a) biotopes with shrews, rodents, hares and birds; (b) biotopes with shrews, rodents, hares, deer and birds, and (c) island locations where the varying hare (Lepus timidus) is the only mammalian tick host.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Glacier/Snow Melt, Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

General Geographical Feature, None or Unspecified

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Sweden

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Tick-borne Disease

Tick-borne Disease: Lyme Disease, Tick-borne Encephalitis

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified